

Insects

Teacher Anne Girven

YEAR	LEVEL	DURATION
3-4	2	3-4 weeks

Achievement Objective Being Assessed	Learning Outcomes
Interpersonal Speaking	Observe, ask questions, share their experiences and investigations relating to "insects".
Interpersonal Listening	Listen to and interact with others in class or group discussion, expressing opinions.
Science Level 2 Making Sense of the Living World	Investigate and understand the general functions of the main parts of insects.

Supporting Achievement Objective	Learning Outcomes
Transactional Writing	Write explanations, state facts and recount events related to insect observations and investigations.

Teacher background reading

- [Effective Communication](#) by Gillian Bertram
- [Oral Language - Exemplar Project](#)

Teaching and learning activities

Select and adapt these learning activities to best meet the needs of your students, and to fit the time available:

Set up an Insect Centre with resources

Teacher and students locate and select information to use throughout the unit, from websites, [School Journals](#), [National Library](#), students' own resources, videos. Develop throughout the unit a chart about common insects in New Zealand. Encourage students to add information to this chart as a result of their investigation, observation, reading and viewing.

Links for Students

Collaborative online projects:

- [*Incredible Insects*](#)

Assessment

Assessment Task

Students to be given the assessment criteria for the oral presentation prior to their investigation and research. Discuss the process of finding and recording information to investigate an insect, to plan questions, eg. What do I want to find out? Discuss how to research using online texts, Internet sites, school journals, texts from the library. Students will record their findings including a detailed labelled diagram to demonstrate understanding of the functions and main parts of an insect. Oral presentation to the class. Teacher or students video the individual oral presentations for oral assessment and feedback. Students self assess their oral presentation and their listening to others.

[assessment \(RTF 10KB\)](#)

[self assessment \(RTF 227KB\)](#)

Insects

Assessment Schedule

Interpersonal Listening

LEVEL 1

Listen and respond to others.

Key Indicators

The student will:

- demonstrate through their participation a level of interest.
- answer a simple question.
- respond to an oral instruction.

LEVEL 2

Listen to and interact with others in a group or class situation.

Key Indicators

The student will:

- take part in group discussion.
- ask relevant questions in class or group discussion.

Interpersonal Speaking

LEVEL 1

Converse and talk about personal experiences.

Key Indicators

The student will:

- speak about their feelings and ideas.
- recount personal experiences.

LEVEL 2

Converse, ask questions and talk about events and personal experiences in a group.

Key Indicators

The student will:

- ask relevant questions.
- take part in a discussion.
- give simple explanations.

Science Level 2

Making Sense of the Living World

Investigate and understand the general functions of the main parts of an insect.

Key Indicators

The student will be able to:

- draw and label a diagram of an insect
- explain the general functions of the body parts

Insects

Self Assessment

Assessment - Insects

Name: _____

Date: _____

I listened to others.			
I was able to ask questions.			
I was able to talk about my insect.			
I could draw and label the main parts of an insect.			
I could explain the different body parts of an insect.			
I could explain what an insect is.			

Draw and label an insect

Next time I need to:

Signed Student_____

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RESOURCES

Electronic

- [*Yahooligans! Insects*](#)
Links to children's insect sites.
- [*Using Insects in the Classroom*](#)
- A teacher's guide to six-legged science.
- [*Katterpillars \(and Mystery Bugs\)*](#)
Entomology for kids.
- [*Insects on the Web*](#)
Includes Bug Bios - a database of photos and descriptions of a variety of insects.
- [*Mosquito Fact Sheet*](#)
Here are the basic facts about a very pesky, and sometimes dangerous insect.
- [*Bugs and Insects*](#)
The best Web resources from Internet educator Walter McKenzie!
- [*Insectclopedia*](#)
Insect Lessons Plans
- [*Adopt an Insect*](#)
Insect lesson ideas and resources.
- [*Using Live Insects in Elementary Classrooms*](#)

Print

- School Journals
- National Library Books
- Gawith, G. (1998) *Action Learning* Longman Paul Auckland

Videos

- Insects - An Eyewitness Progress Series
- Insects - Life Cycles

Learning task 1: Introduction

Introduction

Students to share their understanding and knowledge of "insects". Draw and label an insect - this will be used again at the end of the unit when children draw and label an insect that they have researched ([before \(RTF 246KB\)](#)).

Group discussion

- What do I know about insects?
- What do I want to find out about insects?

Students will [brainstorm \(RTF 140KB\)](#) , [concept \(RTF 187KB\)](#) or [mindmap \(RTF 16KB\)](#) to record prior knowledge.

Word Bank

Develop a word bank as you learn about and read about insects, for example head, thorax, abdomen, invertebrate, antennae.

[An Entomological Glossary](#)

Insects and Spiders

Establish the criteria to help distinguish insects and spiders. What is an insect? How will we find out?

Insect (s) - any small invertebrate animal (without backbone or spinal column) with six legs, two or four wings, and usually a body in three segments, for example, ants, bees, beetles, butterflies, casemoths, caterpillars, crickets, earwigs, flies, grasshoppers, huhu beetles, locusts, moths, praying mantids, spittle bug, stick insects, wasps, weta.

Spider (s) - an eight legged arthropod (animal with segmented body and jointed limbs) many species of which spin webs especially to capture insects as food.

- [Anthropod Information](#)
- [Te Papa: Spider FAQ](#)

Record students' responses on a chart. Shared Reading: School Journal - Spider's Web (1993 Junior Journal No 9). Compare insects and spiders using a Venn diagram.

- [Basic Venn Diagram](#)
- [Venn Diagram](#)

Shared Reading

Use School journals or picture books with text or wordless texts. Discuss the attributes of insects, use appropriate terms to describe the major parts of the insect. Introduce and teacher model [facts \(RTF 151KB\)](#) .

- [Wetas with Backpacks](#)
- [Entomology for beginners](#)

School Journals:

Insects and disease - 1983 Pt 4 No. 2
The ant's nest - 1995 Pt 2 No. 3
My ant farm - 1991 Pt 1 No. 5
The tiny ant - 1994 Pt 1 No. 4 (poem)
Ants at the Olympics - 1989 Pt 3 No. 3 (poem)
Dear Mosquitoes - 1995 YPW
Insect noises - 1983 Pt 4 No. 2
Leaf miners - 1980 Pt 1 No. 1
Mosquito and Sandfly - 1983 Pt 1 No. 3
Bees on a bike - 1994 Pt 1 No. 5
Delightful bees - 1984 Pt 2 No. 4 (poem)
In the hollow willow - 1995 Pt 2 No. 1 (poem)
Royal jelly for a Queen - 1987 Pt 3 No. 1
Up and away - 1990 Pt 2 No. 1
Winter Bees - 1994 Pt 4 No. 2
Beetle's tale - 1988 Pt 4 No. 1
Butterflies love bananas - 1991 Pt 1 No. 2
Butterfly - 1983 Pt 3 No. 2(poem)
Butterfly - 1988 Pt 3 No. 1
The butterfly and the kite - 1985 Pt 1 No. 2
The casemoth - 1989 Pt 1 No. 5
Caterpillars - 1992 Junior Journal No. 7
The crafty caterpillar - 1988 Pt 1 No. 1
Ten loopy caterpillars - 1984 Junior Journal No. 1
The cricket - 1990 Junior Journal No. 5 (poem)
The cricket - 1992 Pt 3 No. 1(poem)
Ear wig babies - 1993 Pt 1 No. 4
The fly - 1988 Pt 2 No. 4(poem)
How flies walk upside down - 1984 Junior Journal No. 1
Flies for dinner - 1985 Junior Journal No. 2
The unrepentant grasshopper - 1983 Pt 2 No. 2
Huhu grubs are good to eat - 1989 Pt 2 No. 4
The ancient enemy (locusts) - 1985 Pt 4 No. 1
The Gum Emperor - 1985 Pt 2 No. 1
Life under a leaf - 1981 Pt 2 No. 2
Moths - 1992 Pt 3 No. 1(poem)
Praying mantis has a meal - 1984 Pt 1 No. 3
What is this? - 1993 Pt 1 No. 2
Stick insects - 1988 Pt 1 No. 2
Sticky end for a weta - 1981 Pt 1 No. 1
A wasp's mud nest - 1982 Pt 1 No. 3

The wasp's paper palace - 1987 Pt 2 No. 1
A home for a weta - 1986 Pt 1 No. 2
Letter to a weta - 1995 Junior Journal No. 3
The putaputaweta song - 1986 Pt 1 No. 2 (poem)
Weta weriweri - 1995 Junior Journal No. 13 (poem)
Wetas with backpacks - 1995 Junior Journal No. 13
Bugs, bugs, bugs - 1997 Pt 1 No. 3 (poem)
Double act - 1998 Pt 3 No. 1
Dragonfly - 1993 Pt 1 No. 4
The fleas have a party - 1997 Pt 1 No. 1
Get to know a butterfly - 1997 Pt 3 No. 3
Strange facts about beautiful butterflies - 1997 Pt 3 No. 3

Entomological Dictionary

A

Abdomen. The hindmost of the three main body divisions of an insect.

Acaricide. A chemical employed to kill and control mites and ticks.

Acetyl choline. A substance present in many parts of the body of animals and important to the function of nerves.

Acrostichal Bristles. The two rows of hairs or bristles lying one on either side of the mid-line of the thorax of a true fly.

Active Space. The space within which the concentration of a pheromone or other behaviourally active substance is concentrated enough to generate the required response, remembering that like light and sound pheromones become more dilute the further they radiate out from their source.

Aculeate. (Hymenoptera) Those members of the Hymenoptera which possess a sting.

Acuminate. Tapering to a long point.

Adeagus. The part of the male genitalia which is inserted into the female during copulation and which carries the sperm into the female. Its shape is often important in separating closely related species.

Adecticous. Of pupa: referring to the state in which the pupa does not possess movable mandibles, the opposite being Decticous.

Aestivation. Summer dormancy, entered into when conditions are unfavourable for active life i.e. it is too hot or too dry.

Age Polyethism. The regular changing of roles of colony members as they get older.

Air sac. A dilated portion of a trachea

Alar Squama. The middle of three flap-like outgrowths at the base of the wing in various flies.

Alate. Winged; having wings.

Alitrunk. Name given to the thorax and propodeum of 'wasp-waisted' hymenopterans.

Allopatric. Two or more forms of a species having essentially separate distributions.

Alternating Generations. When two generations are produced within a life cycle each producing individuals of only one sex, either male first and then female or visa-versa.

Alula. In insects (not birds) the outermost of the three flap-like outgrowths at the base of the wing in various flies: really a part of the wing membrane.

Aldrin. (common name). A synthetic insecticide; a chlorinated hydrocarbon of not less than 95 per cent 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-1,4:5,8-dimethanonaphthalene; moderately toxic to mammals, acute oral LD₅₀ for rats 44 mg/kg; phytotoxicity: none when properly formulated, but some crops are sensitive to solvents in certain formulations.

Aliphatic. A term applied to the "open chain" or fatty series of hydrocarbons.

Alkaloids. Substances found in plants, many having powerful pharmacologic action, and characterized by content of nitrogen and the property of combining with acids to form 'salts'.

Alloparental. When individuals other than the parent assist in the caring for that parents offspring.

Altruistic. Self-destructive. or potentially self-destructive behaviour performed for the benefit of others.

Ambrosia. The fungus cultivated by wood-boring beetles of the family Scolytidae

Ametabola. The insects which develop without metamorphosis, namely the Protura, Thysanura, and Collembola.

Amide. Compound derived from carboxylic acids by replacing the hydroxyl of the -COOH by the amino group, -NH₂-.

Amine. An organic compound containing nitrogen, derived from ammonia, NH₃, by replacing one or more hydrogen atoms by as many hydrocarbon radicals.

Amino acid. Organic compounds that contain the amino (NH₂) group and the carboxyl (COOH) group. Amino acids are the "building stones" of proteins.

Ammonia. A colorless alkaline gas, NH₃, soluble in water.

Anal. Pertaining to last abdominal segment which bears the anus.

Anal angle. The small apical area enclosed by the inner and outer margins of the hindwing.

Anal fold. A fold in the inner margin of the hindwing.

Anaplasmosis. Infection with Anaplasma, a genus of Sporozoa that infests red blood cells.

Anasa wilt. A wilt disease of cucurbits caused solely by the feeding of the squash bug, no parasitic microorganism involved.

Androconia. (singula = Androconium) In male butterflies, specialised wing scales (often called scent scales) possessing special glands which produce a chemical attractive to females.

Anemic. Deficient in blood quantity or quality.

Annulate. Formed in ring-like segments or with ring-like markings.

Antenna. (pl., antennae). Pair of segmented appendages located on the head and usually sensory in function - the 'feelers'.

Antennation. Touching with the antenna

Antenodal Veins. Small cross-veins at the front of the dragonfly or damselfly wing, between the wing base and the nodus.

Anterior. Concerning or facing the front, towards the head.

Antibiosis. An association between two or more organisms that is detrimental to one or more of them.

Anticoagulin. A substance antagonistic to the coagulation of blood.

Anus. The posterior opening of the digestive tract.

Anal veins. The hindmost, or most posterior longitudinal wing veins.

Aorta. The anterior, non-chambered, narrow part of the insect heart which opens into the head.

Apex. The point where the costal vein and the outer margin of the forewing meet.

Apiary. A place where bees are kept, normally a group of hives.

Apical. At or concerning the tip or furthest part of any organ: apical cells, for example are at the wing-tip.

Apical area Of the forewing, the area just inside of and contiguous with the apex.

Appendage. Any limb or other organ, such as an antenna, which is attached to the body by a joint

Appendix. In insects, a short vein, especially a short continuation after the main vein has changed direction.

Apterous. Without wings.

Apterygote. Any member of the Apterygota -primitively wingless insects (i.e. insects which have never developed wings during their evolutionary history) in modern classifications this includes the Thysanura but not Collembola Diplura and Protura which are no longer considered insects, but are termed Hexapods instead .

Aquatic. Living in water.

Arachnida. A class of arthropods which include the scorpions, spiders, mites, ticks, among others.

Arboreal. Living in, on, or among trees.

Arista. A bristle-like outgrowth from the antenna in various flies.

>Aristate. Bearing an arista or bristle.

Arolium. A small pad between the claws on an insect's foot. Usually very small, but well developed in grasshoppers and some other insects.

Arrhenoyoky. The production of males from unfertilised eggs.

Arthropoda. A phylum of animals with segmented body, exoskeleton, and jointed legs.

Arthropods. Animals belonging to the phylum Arthropoda.

Asymmetrical. Organs or body parts not alike on either side of a dividing line or plane.

Astelocytarus. Pertaining to nests, normally those of social wasps, in which the comb is attached directly to the support.

Aster yellows. A virus disease of many kinds of plants transmitted by the six spotted leaf hopper and characterized by stunting of plants, sterility, and chlorosis in foliage.

Attractants. Substances which elicit a positive directional response; chemicals having positive attraction for animals such as insects, usually in low concentration and at considerable distances.

Axon. The process of a nerve cell that conducts impulses away from the cell body.

B

Basal. Concerning the base of a structure - that part nearest the body. Basal cells in Diptera are generally small cells near the base of the wing.

Basitarsus. The 1st segment of the tarsus - usually the largest.

Batumen. A protective layer of propolis or hard cerumen that encloses the nest cavity of a stingless bee colony.

Benzene hexachloride. (chemical name) or BHC. (common name). A synthetic insecticide, a chlorinated hydrocarbon, 1,2,3,4,5,6-hexachlorocyclohexane of mixed isomers; slightly more toxic to mammals than DDT, acute oral LD51 for rats about 200 mg/kg; phytotoxicity: more toxic than DDT, interferes with germination, suppresses growth and reduces yields except at low concentration; certain crop plants, as potato absorb crude BHC with consequent tainting of tubers.

Bilateral symmetry. Similarity of form, one side with the other.

Biological control. The control of pests by employing predators, parasites, or disease; the natural enemies are encouraged and disseminated by man.

Bionomics. The study of the habits, breeding, and adaptations of living forms.

Bipectinate. Feathery, with branches growing out on both sides of the main axis: applied mainly to antennae.

Bisexual. Having two sexes distinct and separate; i.e. a species with males and females.

Bivouac. The mass of army ant workers within which the queen and brood, live while the colony is not on the move.

Bivoltine. Having two generations per year.

Blastogenesis. The origination of different castes, within a species, from the egg by means other than genetic.

Book lung. A respiratory cavity containing a series of leaflike folds.

Bot. The larva of certain flies that are parasitic in the body of mammals.

Brachypterous. With short wings that do not cover the abdomen, used of individuals of a species which otherwise has longer wings.

Bract. A small leaf at the base of the flower.

Brood. In insects, a group of individuals of a given species which have hatched into young or which have become adult at approximately the same time and which live together in a defined and limited area. Often referring to the immature stages of ants, bees and wasps.

Bubonic plague. A bacterial disease of rodents and man caused by *Pasteurella pestis* and transmitted chiefly by the oriental rat flea; marked by chills, fever, and inflammatory swelling of lymphatic glands.

Budding. Colony fission, the creation of new colonies by the departure of one or more reproductive females accompanied by a group of workers specifically to establish a new colony.

Bursa Copulatrix. That part of the female genitalia which receives the aedeagus and sperm during copulation. Its structure is often important in separating closely related species.

C

Caecum. (pl., caeca). A sac or tubelike structure open at only one end.

Calcareous. Referring to soils or rocks, possessing those elements which result in alkaline or basic reactions.

Callow. Newly eclosed workers in social insect colonies whose exoskeletons are still soft and whose colour has not fully matured.

Callus. A rounded swelling: applied especially to swollen regions at the front or back of the thorax in various flies.

Calypter. Innermost of the three flap-like outgrowths at the base of the wing in various flies. Also known as the thoracic squama, it generally conceals the haltere.

Calyptodomous. Of the nests of wasps, referring to those which are surrounded by an envelope.

Campodeiform. (applied to a larva) Grub-like, flattened and elongated with well-developed legs and antennae. Many beetle larvae are of this type, and so are those of the lacewings.

Capitate. With an apical knob like enlargement.

Capitulum. Head like structure of ticks which bears the feeding organs.

Carabiform larva. A larva shaped like the larva of a carabid beetle, that is etiolate, flattened, and with well-developed legs; with no filaments on the end of the abdomen.

Carbohydrate. Any of a group of neutral compounds made up of carbon, hydrogen, and oxygen; for example, sugar, starch, cellulose.

Cardo. The basal segment of the maxilla or secondary jaw.

Carina. A ridge or keel.

Carnivorous. Preying or feeding on animals.

Castes. Groups of individuals that become irreversibly behaviorally distinct at some point prior to reproductive maturity. One of three or more distinct forms which make up the population among social insects. The usual three castes are queen, drone (male), and worker. The termites and some of the ants have one or more soldier castes as well.

Caterpillar. The larva of a moth, butterfly, or saw-fly.

Catfacing. The injury caused by the feeding of such insects as plant bugs and stink bugs on developing fruit which results in uneven growth and a deformed mature fruit.

Cauda. The pointed end of the abdomen in aphids.

Caudal. Concerning the tail end.

Cell. An area of the wing bounded by a number of veins. A cell is closed if it is completely surrounded by veins and open if it is bounded partly by the wing margin.

Cellulose. An inert carbohydrate, the chief component of the solid framework or woody part of many plants.

Cement layer. A thin layer on the surface of insect cuticles formed by the hardened secretion of the dermal glands.

Cephalic. Of or pertaining to the head.

Cephalothorax. A body region consisting of head and thoracic segments, as in spiders.

Cerci. (singular: cercus) The paired appendages, often very long, which spring from the tip of the abdomen in many insects.

Cerumen. A mixture of wax and propolis used by social bees in nest construction.

Cervical. Concerning the neck region, just behind the head.

Chaetae. Stiff hairs or bristles (singular: chaeta).

Chaetotaxy. The arrangement of the bristles or chaetae on an insect: especially important in the classification of the Diptera, Collembola and several other groups.

Chelicera. (pl., chelicerae). The anterior pair of appendages in arachnids, the fangs.

Chigger. The parasitic larva of trombiculid mites.

Chitin. The tough horny material, chemically known as a nitrogenous polysaccharide, which makes up the bulk of the insect cuticle, also occurs in other arthropods.

Chorion. The inner shell or covering of the insect egg.

Chromosomes. At cell division the dark-staining, rod-shaped structures which contain the hereditary units called genes.

Chrysalis. The pupa of a butterfly.

Ciliated. Bearing minute hairs (cilia).

Cladogram. A diagram showing nothing more than the sequence in which groups of organisms are interpreted to have originated and diverged in the course of evolution.

Class. A division of the animal kingdom lower than a phylum and higher than an order, for example the class Insecta.

Clavate. Club-shaped, with the distal end swollen: most often applied to antennae.

Claustal Foundation. A way of setting up of a new colony by a queen, or king and queen in the termites, which involves her/them being sealing her/themselves a way in a small chamber and raising the first group of workers entirely (or almost so) on stored body reserves (fat and often the flight muscles).

Clavus. Posterior part of the forewing of of heteropteran bugs.

Cleptoparasitism. Where one female uses the resources and nest of another individual (of either the same or a different species) to provide for her young thus usurping the owners efforts and preventing her from using them.

Cline. A progressive, usually continuous change in one or more characters of a species over a geographic or altitudinal range.

Club. The thickened terminal (farthest from the head) end of the antennae.

Clypeus. Lowest part of the insect face, just above the labrum.

Coarctate. (applied to pupae) Enclosed within the last larval skin, which therefore acts as a cocoon and protects the pupa. Such pupae are found in the flies (Diptera, of the sub-order Cyclorrhapha.).

Cocoon. A case, made partly or completely of silk, which protects the pupa in many insects, especially the moths. The cocoon is made by the larva before it pupates.

Colony. A small or large locally isolated population.

Colony. Of social insects, a group which co-operates in the construction of a nest and in the rearing of the young.

Comb. The grouped cells of the nests of social many hymenoptera.

Comb. A group of spines on the leg of an insect specifically used for cleaning other parts of the insects body.

Commensalism. Symbiosis, one or more individuals from two or more species living together such that one benefits but neither loses fitness.

Commissure. A bridge connecting any two bodies or structures on a body.

Communal. Where females of one species co-operate in nest building but not in brood care.

Complete metamorphosis or Complex metamorphosis. Metamorphosis in which the insect develops through four distinct stages, e.g., ova or egg, larva, pupa, and adult or imago; the wings (when present) develop internally during the larval stage.

Compound eye. An eye consisting of many individual elements or ommatidia each of which is represented externally by a facet.

Connective. A longitudinal cord of nerve fibers connecting successive ganglia.

Contiguous. Touching - usually applied to eyes (see also Holoptic).

Conspecific. Belonging to the same species.

Construction Gland. A gland of wasps producing a size-like substance which enables them to make paper out of wood-pulp.

Copularium. The first chamber built by a newly mated pair of sexual termites.

Corbicula. The pollen basket on the hind leg of many bees, formed by stout hairs on the borders of the tibia.

Corium. The main part of the forewing of a heteropteran bug.

Cornicle. One of the pair of small tubular outgrowths on the hind end of the aphid abdomen.

Corpora allata. A pair of small endocrine glands located just behind the brain.

Cosmopolitan. Occurring throughout most of the world.

Costa. One of the major longitudinal veins, usually forming the front margin of the wing and usually abbreviated to C. The costal margin is the front edge of the wing.

Costal Cell. The cell between the costa and the sub-costal vein.

Costal Fold. A narrow, thin membrane folded back on the upper surface of the costa of the forewing of butterflies, it contains androconia

Coxa. The basal segment of the insect leg, often immovably attached to the body.

Crawler. The active first instar of a scale insect.

Cremaster. The cluster of minute hooks (sometimes just one larger hook) at the hind end of a lepidopterous pupa: used to grip the pupal support.

Crochets. (Pronounced crow-shays). Hooked spines at tip of the prolegs of lepidopterous larvae.

Crop. The dilated section of the foregut just behind the esophagus.

Cross-vein. A short vein joining any two neighboring longitudinal veins.

Cryptic. Colouring and or pattern adapted for the purpose of protection from predators or prey by concealment.

Cryptobiotic. Leading a hidden or concealed life.

Cubitus. One of the major longitudinal veins, situated in the rear half of the wing and usually with 2 or 3 branches: abbreviated to Cu.

Cuneus. A more or less triangular region of the forewing of certain heteropteran bugs, separated from the corium by a groove or suture.

Cursorial. Adapted for running.

Cuspidal. Two segments of curved lines meeting and terminating at a sharp point.

Cuticle. The outer noncellular layers of the insect integument secreted by the epidermis.

Cyclorrhaphous Diptera. The group of flies which emerge from the puparium through a circular opening at one end of the puparium. These flies belong to the more advanced families.

Cytology. The study of cells and their functioning.

D

DDT. (common name). A widely used synthetic insecticide; a chlorinated hydrocarbon, dichloro diphenyl trichloroethane.

Dealate. Wingless as a result of the insect casting or breaking off its own wings, as in newly mated queen ants and termites.

Decticous. Of pupa: referring to the state in which the pupa possesses movable mandibles which can be used for biting, the opposite being Adepticous.

Dengue. (pronounced deng'e). A virus disease of man marked by severe pains in head, eyes, muscles, and joints and transmitted by certain mosquitoes.

Dentate. Toothed, possessing teeth or teeth like structures.

Denticulate. Bearing very small tooth-like projections.

Deutonymph. The third instar of a mite.

Diapause. A period of suspended animation of regular occurrence in the lives of many insects, especially in the young stages.

Diaphragm. A horizontal membranous partition of the body cavity.

Differentiation. Increase in visible distinctive morphology.

Dimorphic. Occurring in two distinct forms.

Dimorphism. A difference in size, form, or color, between individuals of the same species, characterizing two distinct types.

Discal. The central portion of a wing from the costa to the inner margin.

Discal Cell. Name given to a prominent and often quite large cell near the middle of the wing. The discal cell of one insect group may not be bounded by the same veins as that of another group.

Distad. In a direction away from the body.

Distal. Concerning that part of an appendage furthest from the body.

D.N.A. An abbreviation for Deoxyribonucleic Acid a large molecule which stores the data in our genes in the form of a 3 character code. D.N.A. is a self replicating molecule.

Dorsal. On or concerning the back or top of an animal.

Dorsal Nectary Organ. In the larvae of many species of Lycaenidae (Blue Butterflies) a gland located in the dorsal region of the 7th abdominal segment, it secretes a sweet substance which is attractive to ants.

Dorsal ocellus. The simple eye in adult insects and in nymphs and naiads.

Dorsal shield. The scutum or sclerotized plate covering all or most of the dorsal surface in males and the anterior portion in females, nymphs, and larvae of hard-backed ticks.

Dorso-central Bristles. The 2 rows of bristles running along the thorax of a fly on the outer side of the acrostichal bristles.

Dorso-lateral. Towards the sides of the dorsal (upper) surface.

Dorso-ventral. Running from the dorsal (upper) to the ventral (lower) surface.

Dorsum. The upper surface or back of an animal.

Drone. The male honey bee.

Dulosis. The act of slave making in ants, a species which makes a slave of another is often referred to as Dulotic.

E

Ecdysis. The moulting process, by which a young insect changes its outer skin or pupal case.

Ecdlosion. Emergence of the adult or imago from the pupa

Ectoderm. The outer embryological layer which gives rise to the nervous system, integument, and several other parts of an insect.

Ectohormone. A substance secreted by an animal to the outside of its body causing a specific reaction, such as determination of physiological development, in a receiving individual of the same species.

Ectoparasite. A parasite that lives on the outside of its host.

Egg pod. A capsule which encloses the egg mass of grasshoppers and which is formed through the cementing of soil particles together by secretions of the ovipositing female.

Elateriform larva. A larva with the form of a wireworm; i.e. long and slender, heavily sclerotized, with short thoracic legs, and with few body hairs.

Elbowed Antenna. Antenna, particularly of ants, in which there is a distinct angle between two of the segments - usually between the 1st and 2nd segments, in which case the 1st segment is usually much longer than the others.

Elytron. (plural elytra) The tough, horny forewing of a beetle or an earwig (See also Hemi-elytron)

Emarginate. With a distinct notch or indentation in the margin.

Emery's Rule. The rule resulting from the observation that species of social parasite are very closely related to their host.

Embolium. A narrow region along the front margin of the forewing in certain heteropteran bugs: separated from the rest of the corium by a groove or suture.

Empodium. An outgrowth between the claws of a fly's foot: it may be bristle-like.

Endemic. Restricted to a well defined geographical region.

Endocrine. Secreting internally, applied to organs whose function is to secrete into blood or lymph a substance which has an important role in metabolism.

Endocuticle. The innermost layer of the cuticle.

Endoparasite. A parasite which lives inside its host's body. Most of the ichneumons, are endoparasites

during their larval stages.

Endopterygote. Any insect in which the wings develop inside the body of the early stages and in which there is a complete metamorphosis and pupal stage.

Entomogenous. Growing in or on an insect, for example certain fungi.

Envelope. The carton or wax outermost layer of the nest of a social insect, particularly those of wasps.

Enzyme. An organic catalyst, normally a protein formed and secreted by a living cell.

Epicuticle. The thin, non-chitinous, surface layers of the cuticle.

Epidermis. The cellular layer of the integument that secretes or deposits a comparatively thick cuticle on its outer surface.

Epigaeic. Living or foraging primarily above ground, compared to Hypogaeic the opposite.

Epimeron. The posterior part of the side wall of any of the three thoracic segments.

Epinotum. The first abdominal segment when it is fused with the last thoracic one, relating to the higher thin waisted hymenoptera. Also called a propodeum.

Epipharynx. A component of many insect mouth-parts which is attached to the posterior surface of the labrum or clypeus. In chewing insects it is usually only a small lobe, but in the fleas it is greatly enlarged and used for sucking blood.

Epiproct. An appendage arising from the mid-line of the last abdominal segment, just above the anus. In the bristletails and some mayflies it is very long and forms the central 'tail'

Episternum. The anterior part of the side wall of any of the three thoracic segments.

Epithelium. The layer of cells that covers a surface or lines a cavity.

Ergatogyne. Any female member of a eusocial group whose morphological development is somewhere between that of a worker and a queen.

Eruciform. (applied to a larva) Caterpillar like; more or less cylindrical with a well developed head and stumpy legs at the rear as well as the true thoracic legs. The caterpillars of butterflies and moths are typical examples.

Eusocial A species which lives in a society such that individuals of the species cooperate in caring for the young, which not all of them have produced; there is a reproductive division of labor, with more or less sterile individuals working on behalf of fecund individuals; and there is an overlap of at least two generations in life stages capable of contributing to colony labor, so that offspring assist parents during some period of their life.

Exarate Pupa. A pupa in which all the appendages, legs etc., are free and capable of movement.

Excavate. Hollowed out: applied to the coxae of many beetles, which are hollowed out to receive the femora when the legs are folded.

Excretion. The elimination of the waste products of metabolism.

Exocuticle. The hard and usually darkened layer of the cuticle lying between the endocuticle and epicuticle.

Exoskeleton. Collectively the external plates of the body wall.

Exopterygote. Any insect in which the wings develop gradually on the outside of the body, in which there is only a partial metamorphosis and no pupal stage.

Exuvia. The cast-off outer skin of an insect or other arthropod.

Eye-cap. Hood formed by the base of the antenna and partly covering the eye in certain small moths.

F

Facet. The surface of an ommatidium - one of the units making up the compound eye.

Family. A taxonomic subdivision of an order, suborder, or superfamily that contains a group of related subfamilies, tribes and genera. Family names always end in -idae.

Fascicle. A small bundle; the bundle of piercing stylets of insects with piercing sucking mouthparts.

Femur. The 3rd (counting out from the body) and often the largest segment of the insect leg.

Filament. A thread-like structure, especially one at the end of an antenna.

Filiform. Thread-like or hair-like, applied especially to antennae.

Flabellate. With projecting flaps on one side, applied especially to antennae.

Flagellum. The distal (furthest away from the body) part of the antenna, beyond the 2nd segment.

Foregut. The anterior part of the alimentary canal from the mouth to the midgut.

Fossorial. Adapted for digging.

Foveola. (pl. foveolae) One of the paired depressions on each side of the vertex in grasshoppers.

Frenulum. The wing-coupling mechanism found in many moths.

Frons. Upper part of the insect face, between and below the antennae and usually carrying the median ocellus or simple eye. In true flies (Diptera) it occupies almost all of the front surface of the head apart from the eyes.

Frontal Bristles. The two vertical rows of bristles running down the face of a fly from the ocelli to the antennae

Fronto-orbital Bristles. The short row of bristles on each side of a fly's head between the eye and the frontal bristles.

Furcula. The forked spring of a springtail.

Fuscous. Smokey grey-brown in colour, normally applied to wings.

G

Galea. the outer branch of the maxillae, the inner one being the lacinia.

Gall. An abnormal growth of a plant caused by the presence in its tissues of a young insect or some other organism. Aphids, gall wasps, and gall midges are among the major gall-causing insects.

Ganglion. A nerve mass that serves as a center of nervous influence.

Gastric caeca. The sac-like diverticula at the anterior end of the midgut.

Gaster. The hymenopteran abdomen - apart from the 1st segment (the propodeum) which is fused to the thorax. The front part of the gaster often forms a narrow waist.

Gena. The cheek - that part of the head below and behind the eye.

Genal Comb. A row of stout spines on the lower border of the cheek of certain fleas.

Generation. The group of individuals of a given species that have been reproduced at approximately the same time; the group of individuals of the same genealogical rank.

Geniculate. Abruptly bent or elbowed (see Elbowed Antenna).

Genital claspers. Organs of the male genitalia which serve to hold the female during copulation.

Genitalia. The copulatory organs of insects and other animals. The shape and arrangement of the genitalia are often used to distinguish closely related and otherwise very similar species.

Genotype. The total genetic character of an organism, i.e. all its D.N.A. or genes

Genus. A group of closely related species (plural: genera). The name of the genus is incorporated into the scientific names of all the member species: *Pieris napi* and *Pieris rapae*, for example, both belong to the genus *Pieris*.

Gill. Breathing organ possessed by many aquatic creatures, including numerous young insects. Insect gills are usually very fine outgrowths from the body and they contain numerous air-tubes, or tracheae. Oxygen passes into the tubes from the water by diffusion.

Girdle. A silken thread supporting the midsection of a pupa.

Glabrous. Without hairs.

Glossa. (plural glossae) One of a pair of lobes at the tip of the labium or lower lip: usually very small, but long in honey bees and bumble bees, in which the two glossae are used to suck up nectar.

Gnathosoma. The anterior part of the body of mites and ticks which bears the mouth and mouthparts.

Gregarious. Living in groups.

Grub. A scarabaeiform larva, i.e. a thick bodied larva with thoracic legs and well developed head; usually sluggish.

Gynandromorph. An individual creature with a mixture of male and female characteristics. One half of the body may be male and the other half female. This is particularly noticeable when it occurs among the blue butterflies and others in which the sexes are differently coloured.

H

Haemolymph. The blood plasma or liquid part of the blood, though generally synonymous for blood of insects.

Habitus. Body-build, general appearance.

Haltere. One of the club-shaped 'balancers' found on each side of the metathorax among the true flies (Diptera). They are the much-modified hind wings.

Hamuli. The minute hooks on the front edge of the hind wing of bees and other hymenopterans, used to link the front and hind wings together. The hook which holds the springtail's spring in place is also called the hamula.

Haustellate. Adapted for sucking liquids rather than biting solid food.

Heart. The chambered, pulsatile portion of the dorsal blood vessel.

Head. The anterior body region of insects which bears the mouthparts, eyes, and antennae.

Hematophagous. Feeding or subsisting on blood.

Hemi-elytron (plural hemi-elytra). The forewing of a heteropteran bug, differing from the beetle elytron in having the distal portion membranous.

Hemimetabola. Insects with simple metamorphosis, with no pupal stage.

Hemimetabolous. Having an incomplete metamorphosis, with no pupal stage in the life history.

Hermaphroditic. Containing the sex organs of both sexes in one individual.

Heteromerous. (of beetles) Having unequal numbers of tarsal segments on the three pairs of legs.

Hexapod. An animal possessing six legs, more specifically the parent group that contains insects and their close kin.

Hibernation. Dormancy during the winter.

Hindgut. The posterior part of the alimentary canal between the midgut and anus.

Histosiphon. Same as stylostome. The tube formed by the host as a result of the feeding of a chigger secreting salivary fluids, the chigger partially digests skin tissues, which induces the host to form a proteinaceous tube walling off the injury.

Holometabola. The higher insects which have complex metamorphosis.

Homologous. Organs or parts which exhibit similarity in structure, in position with reference to other parts, and in mode of development, but not necessarily similarity of function, are said to be homologous.

Holometabola. The higher insects which have complex metamorphosis.

Holometabolous. Having a complete metamorphosis, with larval and pupal stages in the life history.

Holoptic. With the eyes touching or almost touching on the top of the head: used mainly when describing flies (Diptera).

Holotype. The type specimen of a species is the actual insect from which the original description of that species was produced. If several specimens were used for this purpose, one of them should have been designated as the type. Because the type can be of only one sex, it is usual to designate a certain individual of the opposite sex as the allotype. The original type specimen is then called the holotype. These 'type specimens' are very important in taxonomy and classification.

Homonym. A scientific name which has been given to two different species. When such an instance comes to light one of the species must be given another name.

Hormone. A chemical substance formed in some organ of the body, secreted directly into the blood, and carried to another organ or tissue where it produces a specific effect.

Honeydew. The sweet liquid emitted from the anus of aphids and some other sap sucking bugs.

Host. The organism in or on which a parasite lives; the plant on which an insect or other arthropod feeds.

Humeral Angle. The front basal part of the wing, close to its attachment to the body.

Humeral Vein. A small cross-vein running from the costa to the sub-costa in the humeral (basal) region of the wing.

Hyaline. Clear and colourless, like the wings of most dragonflies.

Hygrophilus. Moisture loving.

Hypermetamorphosis. A type of life history in which the larvae adopts 2 or more distinct forms during its development.

Hyperparasite. A parasitic organism which attacks another parasite.

Hypognathous. Having a vertical head and face with the mouth-parts at the bottom.

Hypopharynx. A component of the insect mouth-parts arising behind the mouth and just in front of the labium or lower lip. Usually short and tongue-like in species with biting jaws, but often drawn out to form a tube for the salivary duct in those species with sucking mouths.

Hypopleural Bristles. A curved row of bristles on the side of the thorax of certain true flies just below and in front of the haltere and just above the base of the hind leg.

Hypostome. In ticks, the median ventral dart-like mouthpart that is immovably attached to basal part of the capitulum.

Hysterosoma. In mites, the posterior part of the body when there is a demarcation of the body between the second and third pair of legs.

I

Imago. The adult insect (Plural imagines)

Incomplete metamorphosis or Simple metamorphosis. Metamorphosis in which the wings (when present) develop externally during the immature stage and there is no prolonged resting stage (i.e. pupa) preceding the last molt; stages included are the egg, nymphal, and adult. Also called gradual or partial metamorphosis, and paurometabolous development.

Inquiline. A creature that shares the home of another species without having any obvious effect on that species.

Insecta. A 'class' of the 'phylum' Arthropoda, distinguished by adults having three body regions: head, thorax, and abdomen; and by having the thorax three-segmented with each segment bearing a pair of

legs.

Instar. The stage in an insect's life history between any two moults. A newly-hatched insect which has not yet moulted is said to be a first-instar nymph or larva. The adult (imago) is the final instar.

Integument. The insect's outer coat.

Intermediate host. The host which harbors the immature stages or the asexual stages of a parasite, a separate organism to that which harbours the sexual stage.

Intercalary Vein. An additional longitudinal vein, arising at the wing margin and running inwards but not directly connected to any of the major veins.

J

Joint. Strictly speaking, an articulation between neighbouring parts, such as the femur and tibia of the leg, but the word is commonly used as a synonym of segment - meaning any of the divisions of the body or its appendages.

Johnston's organ. A sense organ located in the second antennal segment of many insects and particularly well developed in male mosquitoes and certain other Diptera.

Jugum. A narrow lobe projecting from the base of the forewing in certain moths and overlapping the hind wing, thereby coupling the two wings together.

K

Keel. A narrow ridge: also called a carina

L

Labellum. The expanded tip of the labium, used by many flies to mop up surface fluids.

Labial. Concerning the labium.

Labial palpus. (pl., labial palpi). The labial palps, One of the pair of sensory appendages (feeler-like and 2 to 5 segments long) of the insect labium.

Labium. The 'lower lip' of the insect mouth-parts, formed by the fusion of two maxilla-like appendages.

Labrum. The 'upper lip' of the insect mouth-parts: not a true appendage but a movable sclerite on the front of the head.

Labrum-epipharynx. A mouthpart composed of the labrum and epipharynx and usually elongate.

Lacinia. The inner branch of the maxilla, the outer one being the galea

Lamella. A thin, leaf-like flap or plate, the name being applied to the outgrowths of certain antennae.

Lamellate. Possessing lamellae: applied especially to antennae.

Larva. Name given to a young insect which is markedly different from the adult: caterpillars and fly maggots are good examples.

Lateral. Concerning the sides.

Lateral ocellus. The simple eye in holometabolous larvae. Also called stemma (pl., stemmata).

Lateral oviduct. In insects, one of the paired lateral ducts of the female genital system connected with the ovary.

Life history. Habits and changes undergone by an organism from the egg stage to its death as an adult.

Ligulae. Name given to the lobes at the tip of the labium: usually divided into glossae and paraglossae.

M

Maggot. A vermiform larva; a larva without legs and without well-developed head capsule.

Malpighian tubes. Excretory tubes of insects arising from the anterior end of the hindgut and extending into the body cavity.

Mandible. The jaw of an insect. It may be sharply toothed and used for biting, as in grasshoppers and wasps, or it may be drawn out to form a slender needle as in mosquitoes. Mandibles are completely absent in most flies and lepidopterans.

Mandibulate. Having mandibles suited for biting and chewing.

Marginal Cell. One of a number of cells bordering the front margin of the wing in the outer region.

Maxilla. (plural maxillae) One of the two components of the insect mouth-parts lying just behind the jaws. They assist with the detection and manipulation of food and are often drawn out into tubular structures for sucking up liquids.

Maxillary. Concerning or to do with the maxillae.

Meconium. The reddish fluid ejected by a member of the lepidoptera after emerging from the pupa/chrysalis.

Media. The longitudinal vein running through the central region of the wing in most insects: often the 4th and abbreviated to M.

Median oviduct. In insects, the single duct formed by the merging of the paired lateral oviducts; this duct opens posteriorly into a genital chamber or vagina.

Membranous. Thin and transparent (in reference to wings); thin and pliable (in reference to integument).

Mesonotum. The dorsal surface of the 2nd thoracic segment - the mesothorax: usually the largest thoracic sclerite.

Mesopleuron. The sclerite or sclerites making up the side wall of the mesothorax.

Mesoscutellum. Hindmost of the three major divisions of the mesonotum, often triangular or shield-shaped: usually abbreviated to scutellum.

Mesoscutum. The middle and usually the largest division of the mesonotum.

Mesosternum. The ventral surface or sclerite of the mesothorax.

Mesothorax. The 2nd segment of the thorax.

Metamorphosis. Name given to the changes that take place during an insect's life as it turns from a young animal to an adult. These changes may be gradual and not too large, as in the grasshopper, and metamorphosis is then said to be partial or incomplete. On the other hand, the changes may be much greater and they may take place in one big step - as in the butterflies and moths, which change from caterpillars to adults during the pupal stage. Metamorphosis of this kind is said to be complete.

Metanotum. The dorsal surface of the metathorax. It is often very small and its sub-divisions are usually obscured.

Metapleuron. The sclerite or sclerites making up the side wall of the metathorax.

Metasternum. The ventral surface or sclerite of the metathorax.

Metatarsus. The basal segment of the tarsus or foot: usually the largest segment.

Metathorax. The 3rd and last segment of the thorax.

Micropyle. A minute opening or group of openings into the insect egg through which the spermatozoa enter in fertilization.

Microtrichia. Minute hairs projecting from the integument, they are formed around cellular filaments.

Midgut. The middle part of the alimentary canal and the main site of digestion and absorption.

Moniliform. (of antennae) Composed of bead-like segments, each well separated from the next.

Monophagous. Feeding upon only one kind of food, for example one species or one genus of plants.

Moult. To moult is to shed the outer covering of the body - the exoskeleton.

Myiasis. Infestation of the body by the larvae of flies.

N

Naiad. An aquatic, gill-bearing nymph.

Nasutus. (pl., nasuti). A type of soldier caste in certain termites; this form bears a median frontal rostrum through which it ejects a defensive fluid; the jaws are small or vestigial.

Nectar. The sugary liquid secreted by many flowers.

Nectary. A floral gland which secretes nectar.

Neurone. The entire nerve cell including all its processes.

Nit. The egg of a louse.

Nocturnal. Active at night.

Nodus. The kink or notch on the costal margin of the dragonfly wing. The name is also used for the strong, short cross-vein just behind the notch.

Notaulix. One of a pair of longitudinal grooves on the mesonotum of certain hymenopterans, dividing the mesonotum into a central area and two lateral areas (plural notaulices)

Notopleuron. A triangular area on the thorax of certain flies, just behind the humeral callus and occupying parts of both dorsal and lateral surfaces.

Notum. The dorsal or upper surface of any thoracic segment: usually prefixed by pro-, meso-, or meta- to indicate the relevant segment.

Nucleus. The spheroid body within a cell that has the major role in controlling and regulating the cell's activities and contains the hereditary units or genes.

Nurse cells. Cells that are located in the ovarian tubes of certain insects and that furnish nutriment to the developing eggs.

Nymph. Name given to the young stages of those insects which undergo a partial metamorphosis. The

nymph is usually quite similar to the adult except that its wings are not fully developed. It normally feeds on the same kind of food as the adult.

O

Obtect Pupa. A pupa in which the legs and other appendages are closely appressed to the rest of the body and not capable of free movement - as in the butterfly chrysalis.

Occipital Suture. A groove running round the posterior region of the head of some insects and separating the vertex from the occiput. On the sides of the head the same groove marks the posterior boundary of the cheeks or genae.

Occiput. Hindmost region of the top of the head, just in front of the neck membrane. In some insects it is separated from the vertex by the occipital suture, but it is not usually present as a distinct plate or sclerite.

Ocellar Bristles. Bristles arising around or between the ocelli in various flies.

Ocellar Triangle. A triangular area, usually quite distinct from the rest of the head, on which the ocelli of true flies are carried.

Ocellus. (Plural Ocelli) One of the simple eyes of insects, usually occurring in a group of three on the top of the head, although one or more may be absent from many insects.

Oesophagus. The narrow part of the alimentary canal immediately posterior to the pharynx and mouth.

Ommatidium. (pl., ommatidia). One of the units which make up the compound eyes of arthropods.

Ootheca. (pl., oothecae). An egg case formed by the secretions of accessory genital glands or oviducts, such as the purse-like structure carried around by cockroaches or the spongy mass in which mantids lay their eggs

Oral Vibrissae. The pair of large bristles just above the mouth in certain flies: usually simply called vibrissae.

Order. A subdivision of a class or subclass containing a group of related families. Organophosphates. Organic compounds containing phosphorous; an important group of synthetic insecticides belong to this class of chemicals.

Oribatid mite. A mite belonging to the Oribatei, a large unit of mites containing about 35 families in the suborder Sarcoptiformes.

Oviparous. Producing eggs which are hatched outside the body of the female.

Ovipositor. The tubular or valved egg-laying apparatus of a female insect: concealed in many insects, but extremely large among the bush-crickets and some parasitic hymenopterans.

Ovoviviparous. Producing living young by the hatching of the egg while still within the female.

P

Palp. A segmented leg-like structure arising on the maxilla or labium. Palps have a sensory function and play a major role in tasting food.

Paraglossa. One of a pair of lobes at the outer edges of the tip of the labium: with the central glossae, the paraglossae make up the ligula.

Paraproct. One of the 2 lobes bordering the sides of the anus.

Parasite. An organism that spends all or part of its life in close association with another species, taking food from it but giving nothing in return. Ectoparasites live on the outside of their hosts, while endoparasites live inside the host's body.

Parthenogenesis. A form of reproduction in which eggs develop normally without being fertilised. This is the usual method of reproduction among some stick insect species and among some generations of gall wasps and aphids.

Pathogenic. Giving origin to disease.

Pecten. A comb-like structure found at the base of the antenna in some insects.

Pectinate. Having branches which arise from the main axis like the teeth of a comb: usually applied to antennae.

Pedicel. The 2nd antennal segment: the name is also given to the narrow waist of an ant.

Pedipalp. The second pair of appendages of an arachnid, used to crush prey.

Petiolate. Attached by a narrow stalk.

Petiole. The narrow waist of bees and wasps and some other hymenopterans: often known as the pedicel when referring to ants.

Pharynx. The anterior part of the foregut between the mouth and the esophagus.

Pheromone. A substance secreted by an animal which when released externally in small amounts causes a specific reaction, such as stimulation to mate with or supply food to a receiving individual of

the same species.

Phoresis. The usage by one animal of another solely as a means of transport, i.e. certain mites on various other insects.

Phylum (pl., phyla). A major division of the animal kingdom, containing various suborders and classes etc.

Phytophagous. Feeding upon plants.

Phytotoxic. Poisonous to plants.

Platyform larva. A very flattened larva.

Plumose. Feather-like, as in plumose antennae

Pictured.. A term used to describe wings, especially among the Diptera, which have dark mottling on them.

Pilose. Densely clothed with hair.

Pleural. Concerning the side walls of the body.

Pleural Suture. A vertical or diagonal groove on each of the thoracic pleura, separating the episternum at the front from the epimeron at the back.

Pleuron. The side wall of a thoracic segment.

Plumose. With numerous feathery branches: applied especially to antennae.

Pollen. The mass of microspores or male fertilizing elements of flowering plants.

Pollen Basket. The pollen-carrying region on the hind leg, of a bee: also known as the corbicula.

Pollinate. To transfer pollen grains from a stamen to a stigma or ovule of a plant.

Polyembryony. The production of several embryos from a single egg, as in some chalcids.

Polyphagous. Feeding on a variety of plants and or animals.

Porrect. Extending horizontally forward: applied especially to antennae.

Posterior. Concerning or facing the rear.

Postmentum. The basal region of the labium.

Postscutellum. A small division of the mesonotum just behind the scutellum: usually very small or absent, but well developed in certain flies.

Post-vertical Bristles. A pair of bristles - divergent, parallel, or crossing - on the back of the head of various flies, some way behind the ocelli.

Pre-apical. Arising just before the tip: many flies, for example, have pre-apical bristles just before the tip of the tibia.

Precostal area. The area in front of, or to the fore of the costa.

Predaceous. Preying on other animals.

Predator. An animal that attacks and feeds on other animals, usually smaller and weaker than itself.

Prementum. The distal region of the labium, from which spring the labial palps and the ligula.

Preovipositional period. The period between the emergence of an adult female and the start of its egg laying.

Prepupa. The last larval instar after it ceases to feed; often it takes on a distinctive appearance becoming quiescent and rather shrunken, and often looks dead.

Presumptive organization. Arrangement of cells in the embryo into groups which in normal development become a particular organ or tissue.

Pretarsus. In insects the terminal segment of the leg bearing the pretarsal claws.

Primary reproductives. Those members of a social group of insects whose primary role is reproduction, (often the founders of the colony). Compared to secondary reproductive who may produce some young but are primarily involved in some other activity.

Proctodeal valve. In insects, a valve in the anterior end of the hindgut that serves as an occlusor mechanism.

Proboscis. Name given to various kinds of sucking mouths in which some of the mouth-parts are drawn out to form tubes.

Prognathous. Having a more or less horizontal head, with the mouth-parts at the front.

Proleg. One of the fleshy, stumpy legs on the hind region of a caterpillar.

Pronotal Comb. A row of stout spines on the hind margin of the pronotum of certain fleas.

Pronotum. The dorsal surface or sclerite of the 1st thoracic segment.

Propodeum. The 1st abdominal segment in the hymenopteran group known as the Apocrita: it is completely fused with the thorax.

Propupa. In thrips, the next to the last nymphal instar in which the wing pads are present and the legs short and thick. Also in male scale insects.

Prosternum. Ventral surface of the 1st thoracic segment.

Proterosoma. In mites, the anterior part of the body when there is a demarcation of the body between the second and third pair of legs.

Prothoracic gland. One of a pair of endocrine glands located in the prothorax near the prothoracic spiracles.

Prothorax. The 1st or anterior thoracic segment.

Protonymph. The second instar of a mite.

Proventriculus. The posterior section of the foregut.

Pseudoscorpions. Small arachnids, seldom over 5 mm. long, scorpion-like in general appearance but without sting.

Pseudovipositor. The slender tube to which the posterior part of the abdomen is reduced in the female of certain insects.

Proximal. Concerning the basal part of an appendage - the part nearest to the body.

Pruinose Covered with a powdery deposit, usually white or pale blue: especially applied to Odonata.

Pterostigma. A small coloured area near the wing-tip of dragonflies, bees, and various other clear-winged insects: also called the stigma.

Pterygote. Any member of the sub-class Pterygota, which includes all winged and some secondarily wingless insects.

Ptilinum. In Diptera an organ that can be inflated to a bladder-like structure and thrust out through a frontal suture of the head at the time of emergence from the puparium.

Pubescent. Covered with short, soft hair

Pulvillus. The little pad beneath each claw on the foot of a fly.

Punctate. Covered with tiny pits or depressions, like the elytra of many beetles and the thoraxes of many hymenopterans.

Pupa. (pl., pupae). The 3rd stage in the life history of butterflies and other insects undergoing a complete metamorphosis during which the larval body is rebuilt into that of the adult insect a non-feeding and usually inactive stage.

Puparium. (pl., puparia). The barrel-shaped case which conceals the pupa of the house-fly and many other true flies. It is formed from the skin of the last larval instar.

Pupate. To turn into and exist as a pupa.

Pupiparous. Insects which give birth to fully-grown larvae which pupate almost immediately are said to be pupiparous. The main examples are various blood-sucking flies.

Q

Quadrilateral. A cell near the base of the damselfly wing, whose shape is important in separating the families.

Queen cell. The special cell in which a queen honey bee develops from egg to the adult stage.

R

Race. A variety of a species; a subspecies.

Radial Sector. The posterior of the two main branches of the radius, usually abbreviated to Rs. It usually has several branches of its own.

Radius. One of the main longitudinal veins, running near the front of the wing and usually the 3rd and abbreviated to R. It gives off a posterior branch - the radial sector - and the smaller branches of these veins are numbered R1, R2, etc.

Raptorial. Adapted for seizing and grasping prey, like the -front legs of a mantis.

Rectum. In insects, the posterior expanded part of the hindgut, typically pear shaped.

Reticulate. Covered with a network pattern.

Reproductives. In termites the caste of kings and queens in other social insects only the queens.

Rostrum. A beak or snout, applied especially to the piercing mouth-parts of bugs and the elongated snouts of weevils.

Rudimentary. Poorly or imperfectly developed.

S

Salivary glands. Glands that open into the mouth and secrete a fluid with digestive, irritant, or anticoagulatory properties.

Saprophytic. Living on dead or decaying organic matter.

Scale. A scale insect; a member of the order Homoptera.

Scape. The 1st antennal segment, especially if it is longer than the other segment.

Scarabaeiform. A grub like larva having a thick, soft body with a well-developed head and strong

thoracic legs but with no legs on the hind region: often permanently curved into a C. The larvae of the lamellicorn beetles are of this type.

Sclerite. Any of the individual hardened plates which make up the exoskeleton.

Sclerotization. The hardening and darkening processes in the cuticle (involves the epicuticle and exocuticle with a substance called sclerotin).

Scopa. The pollen-collecting apparatus of a bee, whether it be the pollen basket on the leg or a brush of hairs on the abdomen.

Scopula. A small tuft of hairs.

Scorpion. Any member of the arachnid order Scorpionidae; they have an elongate body and a poison sting at the end of abdomen.

Scutellum. The 3rd of the major divisions of the dorsal surface of a thoracic segment: usually obvious only in the mesothorax and very large in some bugs.

Scutum. The middle of the three main divisions of the dorsal surface of a thoracic segment. Also, in ticks, the sclerotized plate covering all or most of the dorsum in males, and the anterior portion in females, nymphs, and larvae of the Ixodidae.

Sebaceous gland. A gland producing a greasy lubricating substance.

Secondary parasite. A parasite on another parasite.

Segment. One of the rings or divisions of the body, or one of the sections of a jointed limb.

Segmentation. The embryological process by which the insect body becomes divided into a series of parts or segments.

Serrate. Toothed like a saw.

Sessile. Attached to one place and unable to move, like many female scale insects.

Seta. (pl., setae). A bristle.

Setaceous. Bristle-like, applied especially to antennae.

Simple eye. An Ocellus.

Simple metamorphosis. Metamorphosis in which the wings (when present) develop externally during the immature stage and there is no prolonged resting stage (i.e. pupa) preceding the last molt; stages included are the egg, nymphal, and adult. Also called gradual or partial metamorphosis, and paurometabolous development.

Skeletal muscle. In insects, a muscle that stretches across the body wall and serves to move one segment on another.

Social. Living in more or less organized communities of individuals.

Soldier. In termites, sterile males or females with large heads and mandibles; they function to protect the colony.

Solitary. Occurring singly or in pairs, not in colonies.

Species. The basic unit of living things, consisting of a group of individuals which all look more or less alike and which can all breed with each other to produce another generation of similar creatures.

Spermatheca. A small sac-like branch of the female reproductive tract of arthropods in which sperm may be stored.

Spermatophore. A packet of sperm.

Spine. A multicellular, thorn like process or outgrowth of the integument not separated from it by a joint.

Spinose. Spiny.

Spiracle. One of the breathing pores - openings of the tracheal system - through which diffusion of gases takes place. They usually occur on the third thoracic segment and all the abdominal.

Spiracular plate. A plate like sclerite next to or surrounding a spiracle.

Spittle. In insects, a frothy fluid produced by the nymphs of spittlebugs (Cercopidae).

Spur. A large and usually movable spine, normally found on the legs.

Spurious Vein. A false vein formed by a thickening of the wing membrane and usually unconnected with any of the true veins.

Squama. Any of the membranous flaps that arise near the base of the wing in many true flies (plural: squamae).

Stadium. (pl., stadia). The time interval between molts in a developing insect.

Stage. A distinct, sharply differentiated period in the development of an insect, e.g., egg stage, larval stage, pupal stage, adult stage; in mites and ticks, each instar.

Stemma. (pl., stemmata). The simple eye in holometabolous larvae. Also called lateral ocellus.

Sternite. The plate or sclerite on the underside of a body segment.

Stigma. A small coloured area near the wing-tip of dragonflies, bees, and various other clear-winged insects: also called the pterostigma.

Stomodaeal valve. In insects, the cylindrical or funnel-shaped invagination of the foregut into the

midgut.

Striae. Grooves running across or along the body: applied especially to the grooves on beetle elytra.

Striated muscle. Muscle that is composed of fibers with alternate light and dark bands.

Stridulation. The production of sounds by rubbing two parts of the body together: best known in grasshoppers and other orthopterans.

Style. A slender bristle arising at the apex of the antenna.

Style. One of the small paired appendages on the male subgenital plate of some Orthoptera.

Stylet. A needle-like object: applied to the various components of piercing mouthparts and also to a part of the sting of a bee or other hymenopteran.

Stylostome. The tube formed by the host as a result of the feeding of a chigger; in secreting salivary fluids, the chigger partially digests skin tissues, which induces the host to form a proteinaceous tube walling off the injury.

Sub-apical. Situated just before the tip or apex.

Subcosta. Usually the first of the longitudinal veins behind the front edge of the wing, although it is often missing or very faint: abbreviated to Sc.

Sub-imago. Found only among the mayflies, the sub-imago or dun is the winged insect which emerges from the nymphal skin. It is rather dull in colour, but very soon moults again - the only example of a winged insect undergoing a moult - to reveal the imago.

Sub-marginal Cells. Cells lying just behind the stigma in the hymenopteran forewing: important in the identification of bees and sphecids wasps.

Sub-species. A sub-division of a species, usually inhabiting a particular area: visibly different from other populations of the same species but still able to interbreed with them.

Superfamily. A group of closely related families; superfamily names end in -oidea.

Supplementary reproductives. In termites the caste of males and females with short wings, light pigmentation, and small compound eyes. The females lay eggs in the colony supplementing the work of the queen.

Suture. A groove on the body surface which usually divides one plate or sclerite from the next: also the junction between the elytra of a beetle.

Synonym. One of two or more names which have been given to a single species. The earliest name usually (should) takes precedence.

Systemic insecticide. An insecticide capable of absorption into plant sap or animal blood and lethal to insects feeding on or within the treated host.

T

Tarsus. (pl., tarsi). The insect's foot: primitively a single segment but consisting of several segments in most living insects.

Tegmen. (plural tegmina) The leathery forewing of a grasshopper or similar insect, such as a cockroach

Tegula. A small lobe or scale overlying the base of the forewing like a shoulder-pad.

Tergite. The primary plate or sclerite forming the dorsal surface of any body segment.

Tergum. The dorsal surface of any body segment.

Thorax. The middle of the three major divisions of the insect body. The legs and wings (if present) are always attached to the thorax.

Tibia. (pl., tibiae) The forth leg segment between the femur and the tarsus.

Totipotency The potential, throughout life, to express the full behavioral repertoire of the population (even if never actually expressed), and the ability to produce offspring like oneself, exhibiting the full behavioral repertoire of the population, without help.

Trachea. (Plural tracheae). One of the minute tubes which permeate the insect body and carry gases to and from the various organs etc. They open to the air at the spiracles.

Transverse Suture. A suture running across the thorax of many flies and dividing the mesonotum into a scutum and a prescutum.

Triangle. A triangular region near the base of the dragonfly wing, often divided into smaller cells.

Triungulin. Name given to the active 1st- instar larva of oil beetles and some of their relatives: they appear to have 3 claws on each foot.

Trochanter. The second segment of the leg, between coxa and femur: often very small and easily overlooked.

Truncate. Ending abruptly: squared off.

Tubercle. A small knob like or rounded protuberance.

Tymbal. The sound-producing 'drum-skin' of a cicada.

Tympanum. The auditory membrane or ear-drum of various insects.

Type. The type specimen of a species is the actual insect from which the original description of that species was produced. If several specimens were used for this purpose, one of them should have been designated as the type. Because the type can be of only one sex, it is usual to designate a certain individual of the opposite sex as the allotype. The original type specimen is then called the holotype. These 'type specimens' are very important in taxonomy and classification.

U

Uric acid. The chief nitrogenous waste of birds, reptiles and insects-; chemically, C,H,N,O,.

V

Valve. One of the paired components of the ovipositor.

Veins. In insects, the rib like tubes that strengthen the wings.

Vermiform larva. A legless wormlike larva without a well developed head

Venation. The arrangement of veins in the wings of insects. Ventral. Concerning the lower side of the body.

Vertex. The top of the head, between and behind the eyes.

Vestigial. Poorly developed, degenerate or atrophied, more fully functional in an earlier stage of development of the individual or species.

Visceral muscle. A muscle which invests an internal organ.

Vibrissae. The pair of large bristles just above the mouth in certain flies: usually simply called vibrissae.

Viviparous. Bringing forth living or active young instead of laying eggs

W

Wing pads. The undeveloped wings of nymphs and naiads, which appear as two flat structures on each side.

Woollybear. A very hairy caterpillar belonging to the family Arctiidae, the tiger moths.

Workers. In termites, the sterile males and females that perform most of the work of the colony; they are pale, wingless, and usually lack compound eyes; in social Hymenoptera, females with undeveloped reproductive organs that perform the work of the colony.

X, Y, Z

Arthropod Information

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What is an arthropod?

The arthropods constitute over 90% of the animal kingdom and are classified in the phylum Arthropoda. They are distinguished from other animals by:

- an exoskeleton (a skeleton on the outside of the body)
- body divided into distinct parts
- jointed legs and appendages
- bilateral symmetry (both sides of the body are the same)

Class Distinctions

Insects

Grasshoppers, butterflies, beetles, ants, etc. 1,000,000 described world species

- three body regions: head, thorax, abdomen
- six legs attached to the thorax (which has 3 segments)
- adults with one or two pairs of wings attached to the thorax (some have none)
- two antennae
- lateral compound eyes



Arachnids

Spiders, scorpions, ticks, mites, etc. 65,000 described world species

- two body regions: cephalothorax, abdomen
- eight legs
- no antennae
- Mouth parts are chelicerae(modified appendages) which in spiders are fangs



Crustaceans (technically a subphylum)

Classes include crabs, shrimps, lobsters, barnacles, isopods etc. 44,000 described world species

- two body regions
- two pairs of antennae
- 5 or more pairs of legs
- primarily aquatic, few terrestrial

**Chilopods**

Centipedes. 2,800 described world species

- well-defined head
- first pair of legs modified for envenomation
- flattened top to bottom
- one pair of legs per segment
- one pair of antennae

**Diplopods**

Millipedes. 10,000 described world species

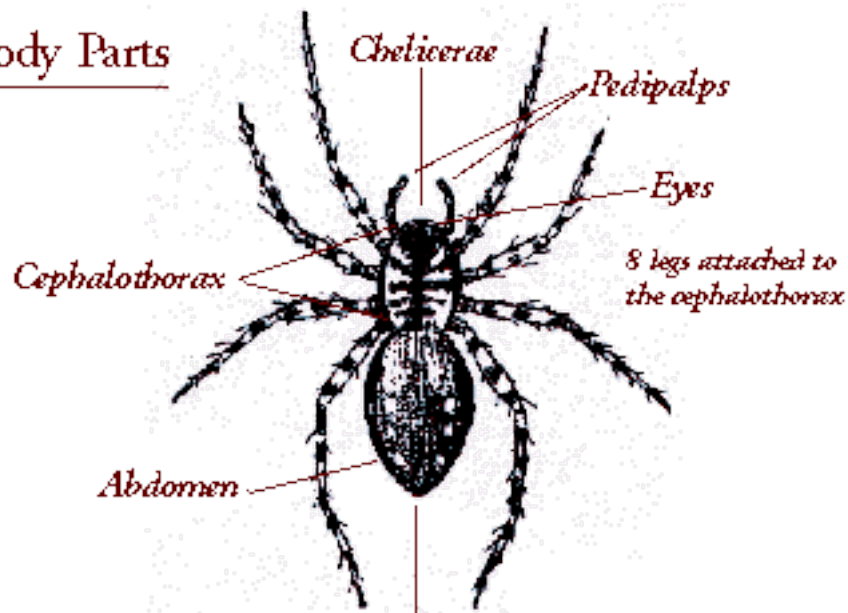
- two pairs of legs per segments, first four segments have 1 pair legs
- one pair of antennae
- well-defined head
- usually cylindrical

**The Arthropod Body Plan**

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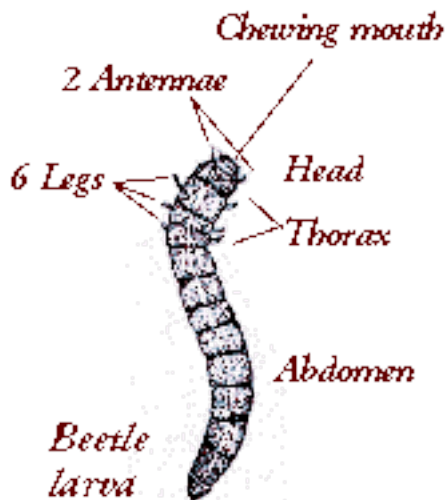
The Arthropod Body Plan

Spider Body Parts

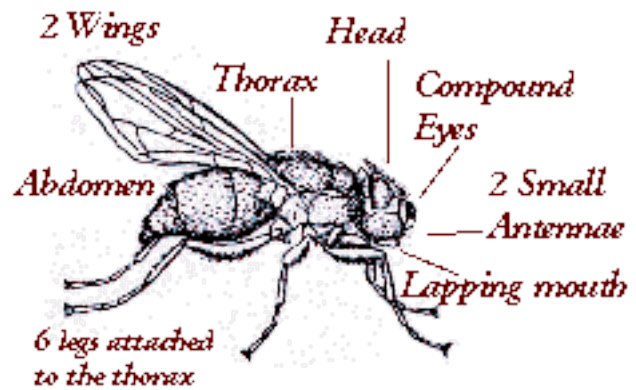


Location of spinnerets used to spin silk for building webs and capturing prey.

Insect Body Parts



Beetle larva



Flies are unique insects with only one pair of fully developed wings. Most adult insects have two pairs of wings.

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Spider FAQs

What do I do if I want to get a spider identified?

You can try and identify it yourself using our [What Spider Is That? section](#). If that doesn't help, you can contact Te Papa's experts via Te Aka Matua Te Papa Library and Information Centre (ph +64 (0)4 381 7000 or email mail@tepapa.govt.nz). If you would like to send your spider in for identification, please see the Expertise section on our [Insects, Spiders, and Similar page](#).

How many kinds of spider are there?

Worldwide, about 35,000 to 40,000 species of spider are known to scientists. In New Zealand, around 1100 species have been discovered with 95 per cent of them found nowhere else on earth. However, this may only be the tip of the iceberg as scientists estimate there are somewhere between 2500 and 3500 species in New Zealand.

Why doesn't a spider get caught in its own web?

Spiders are thought to produce a special liquid that they coat their bodies with. This stops them getting caught in the sticky part of the web.

What is the difference between a spider and an insect?

Many people mistakenly group spiders with insects. While spiders and insects are both arthropods (animals with an exoskeleton) and have a lot in common, there are some important differences that separate them.

Spiders are actually arachnids, a group that includes mites, ticks, scorpions, and harvestmen, among others. The most obvious feature that distinguishes arachnids from insects is the number of legs. Arachnids have eight, while insects only have six.

Unlike insects, spiders don't have antennae (feelers). The main part of the spider's body is also different from an insect's - while an insect has a head, thorax, and abdomen, the spider has the head and thorax fused into one structure called a cephalothorax.

What is ballooning?

This is one method that the young of some species such as katipo and nursery web spiders use to colonise new areas. The spiderling will climb to a point (such as the end of a branch) where it is exposed to air currents. It will then produce a small quantity of silk called gossamer.

The wind catches the gossamer and carries it aloft, taking the spiderling with it. If conditions are right, the spider may not land for hundreds of kilometres, although a journey of only a few kilometres would be more usual.

How do spiders grow?

A spider starts its life as one of a number of fertilised eggs, bound together in a protective silken egg sac. After a few weeks, the spiderling is ready to hatch out.

Usually, the spider does not need to feed straight away as it can survive on yolk reserves from the egg. Spiders do not stay like this forever, but they face a major problem if they are to grow bigger. They have an exoskeleton, as do other arthropods such as insects and crustaceans.

Exoskeleton literally means 'skeleton on the outside'. With the exception of the abdomen, a spider's exoskeleton is quite rigid and can't stretch, preventing the spider from growing. However, spiders and other arthropods get around this problem by moulting.

This process starts with the growth of a new exoskeleton underneath the old one. When the spider is ready to moult, the old exoskeleton splits and gradually the spider pulls itself free.

At this point, the new exoskeleton is still soft and wrinkled. It will be stretched and smoothed before it hardens at its new, larger size. The spider is unable to defend itself until the new exoskeleton dries out.

A spider has to undergo several moults through the course of its life. How many moults usually depends on how large it will grow. Very small spiders usually need fewer moults to reach adulthood than larger spiders such as tarantulas.

Males also tend to be smaller than females, and therefore, usually undergo fewer moults. Males and females generally can't be distinguished from one another until they have reached their final moult. It is only then that the reproductive structures which allow them to be told apart become obvious.

Insects

Fact File

A fact file is a collection of data that the students have gathered following shared, guided or independent reading, usually accompanied by a labelled diagram.

Fact File

THE WETA

wetas live long lives usually 1-2 years

wetas have a fierce appearance

wetas like to live in dark holes and dry places like the inside of a gumboot

cats and rats eat wetas

wetas like to snuggle together in large holes

adult males are bigger than the females and are in charge in their habitat

wetas like to explore on warm, damp, dark nights when there is no moon

the Giant Weta is protected

the antennae is very long, twice the length of the body

Giant Wetas are found only on Little Barrier Island

wetas look like grasshoppers but they cannot fly

Learning task 2: Exploration

Explore the Playground

Look for and [observe insects](#) in your playground. Discuss the need to take care of the natural environment of these insects and for them to be returned to their natural habitat.

Focus question for students to consider - "Where will we look?" Discuss with the class [places to look for insects](#):

- Around doors, gates, fences, walls
- In cracks in the sidewalk
- On plants, shrubs, hedges, trees, bark of trees.
- In crevices in fences, walls
- In corners of rooms, behind doors, under the house in dark places.
- Provide students with magnifying glasses to share and use in their exploration. Use digital camera or video to record student investigations.
- Report back in small groups the information that has been gathered through observation. What types of insects did you find? Where?

Provide students with magnifying glasses to share and use in their exploration. Use [digital camera](#) or video to record student investigations.

Report back in small groups the information that has been [gathered through observation](#). What types of insects did you find? Where?

- [What is this bug?](#)

Language Experience

In small groups, students talk about their [experience](#).

- Teacher talks about her/his experience, models writing about the experience. Teacher or students read the teacher's model.
- Students draw and write about their experiences.
- In pairs, students read and share their writing

Teacher modelling

Modelling both factual and narrative texts enables a teacher to focus students' attention on different writing forms and to develop a shared language.

Modelling empowers students to observe, discover, classify and organise their knowledge about written language and apply this knowledge to their own reading and writing

Provide opportunities for texts to be constructed in front of the students. Planned modelling may include a particular text, based on the teaching focus that is to be developed, and the planned reading and analysis of the text, with the students.

For example, the teacher may read a range of reports to introduce the students to the structure and language features found in report writing. The teacher demonstrates how to write in this particular

form, through the construction in front of the students, discussing the structure and the process as the report is written.

Modelling is a powerful way of demonstrating

- What was the author's intent?
- What would the author need to know?
- How was the information organised?
- How did the author write the text?
- Who was the audience for the text?
- How authors go about writing.
- How they plan for their writing.
- How they work and rework their writing (editing/proof reading).
- How different writing forms are used for different purposes and audiences.

For customisable student check-list, see these Assessment Resource Bank resources:

- [Checklist for Proof-reading](#)
- [Checklist for Editing](#)

Fact File

Following the reading of an appropriate text (Stick Insects 1988 Part 1 No 2) teacher models writing a fact file. Students to draw and label an insect (preferably an observational drawing). Write a fact file (see learning task 1) about the insect, which includes information the students have gained through reading, viewing, talking and observing. Students in small groups share their work.

New Zealand's Insects - Video

View a video (*Insects - An Eyewitness Progress Series* or *Insects - Life Cycles* available from [National Library Auckland](#)) to clarify ideas and to gain information about some of New Zealand's common insects. Discuss and write responses on a chart. Focus questions:

- What have we found out about insects in New Zealand?
- What insects do we have in New Zealand?
- Where would we be most likely to find insects to observe?

See:

- [Suzy's World: Weta](#)
- [Weta: The Struggle to Survive](#)
- [Suzy's World: Glow Worms](#)
- [Glowworms](#)

Classifying Insects

Establish a method for classifying insects according to common characteristics.

- [An Introduction to the Classification of Insects](#)
- [Insect Information](#)

Arthropod Data Collection

[Return to previous page](#) **General Information and Topics to Research**

- Common or scientific name of arthropod
- Stage of arthropod development (egg, larva, nymph, pupa, adult)
- Type of mouth parts (chewing, sucking, piercing, lapping, chelicerae)
- Date arthropod was collected or received
- Role of arthropod in the environment (niche)

If Collected from Nature

- Location it was found (county, state, city, address/natural area name)
- Describe where arthropod was found (e.g., under moist log)
- Climatic conditions (sunny, cloudy, foggy, rainy, etc.)
- Date
- Name of collector
- Describe behavior/activity

Captivity Observations

- Kind of food eaten
- Kind of food preferred by the arthropod
- Date mating is observed
- Date eggs are laid and how many
- Date eggs hatch
- Number of molts to reach adult stage
- Date insect pupates
- Duration of pupal stage
- Date arthropod becomes an adult
- Length of each growth stage (time between molts)
- Date and description of different behaviors (i.e., mating, foraging, defending)

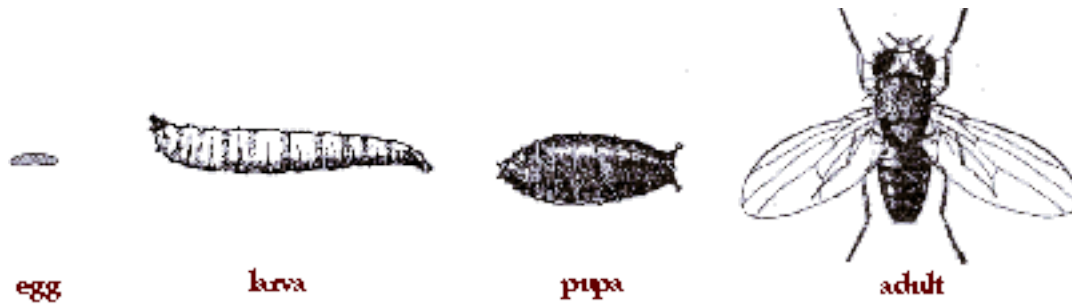
Insect Information

[Return to previous page](#) **Mouth Parts**

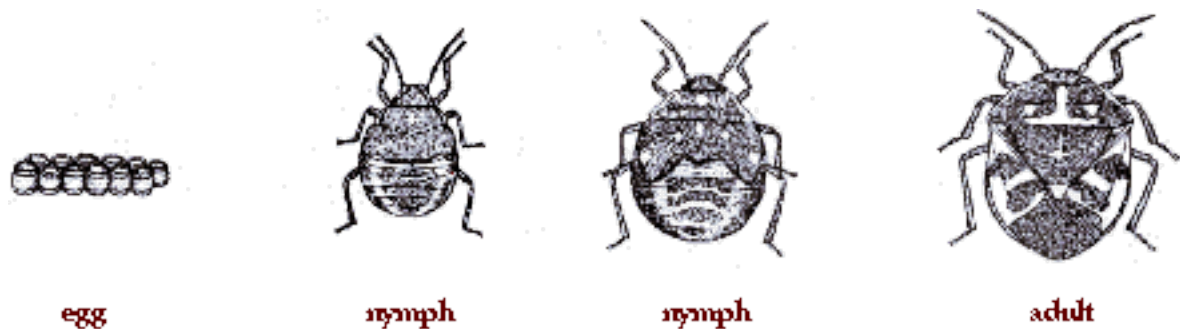
Chewing (beetles), Sucking (adult butterflies), Piercing (true bugs), Lapping (fly), None (some adult moths)

Life Cycles (*Metamorphosis*):

1. **Complete Metamorphosis** (holometabolous). Larvae and adults of these insects are very different and a distinct pupae is formed. Some insects with complete metamorphosis are: beetles, flies, bees, lacewings, butterflies, ants, and caddis flies.



2. **Incomplete (or simple) Metamorphosis** (hemimetabolous). In these insects, the nymph more or less resembles the adult and there is no pupal stage. The example shown below is a plant bug. Some other insects with incomplete metamorphosis are: crickets, true bugs, termites, grasshoppers, and cockroaches.



3. **Ametabolous** insects show no metamorphosis. Here the adult looks like the immature except for the presence of genitalia and gonads. The silverfish is an example.

The exoskeleton limits the potential size of insects, but provides valuable protection to all parts of the insect including its eyes, antennae and the internal breathing tubes (tracheae). Once an insect becomes an adult it will not grow. To grow and become an adult, young insects shed or molt their exoskeleton. Molting happens several times before an insect becomes an adult. A new, flexible skeleton forms beneath the old, hard exoskeleton. While taking in extra air, the insect expands itself and splits the old skin. After crawling out of the old skin, the new, soft exoskeleton starts to harden in minutes but may take several hours or days to harden completely. For some insects like a butterfly, the caterpillar is very different from the adult butterfly. In other insects like grasshoppers the young insects resemble the adults. The younger stages, called nymphs may have different color patterns and undeveloped wings and sexual organs compared with the adult. Compare the pictures above to see the difference between these two kinds of metamorphosis.

Learning task 3: Further activities

Read a variety of texts

Shared, guided, independent.

- Set the purpose for reading each text, for example, an information text, plan questions relevant to the text.
- What is an insect?
- Where will we look for this insect?

- How will we find out more about this insects? Where?
- What are the characteristics of this insect eg an ant?

Throughout the reading programme, teacher model [skimming \(RTF 6KB\)](#) for relevant information, taking notes, summarising information. Students will read/view using a variety of resources to find answers to questions.

Comparing Insects

Students work in groups of three/four and compare two different insects, eg. a bee and a ladybug; an ant, and a cockroach. Students will work together to explore the habitat, eating habits, and physical characteristics of the insect. Use a Venn diagram to record their findings. Students orally share their diagram with another group. Encourage students to ask questions to clarify information.

Ant Farm

Create a class ant farm and observe ants at work:

[How to build an ant farm](#)

Discuss how some insects work together as a community. Watch ants scurry in and around the ant farm.

Focus questions:

- How will we care for the ants?
- How will we feed the ants?
- Do ants eat their food on the spot, or carry it back down the tunnels?
- When an ant finds food, what does it do to tell the others? (As the ant runs, it leaves a trail that other ants. The ants find the food by smelling their way along the trail.)

Read - My Ant Farm 1991 Part 1 No 5

Instructions on how to build an ant farm

Making an "ant farm" for your children is an excellent way to hold their attention for hours and is a good educational tool as well. They can teach children the importance of an eco system as well as responsibility in caring for a creature that relies on them for food and water. "Ant farms" are both easy to make and inexpensive. They are a good pet for children that live in apartments or a home with limited space. They are perfect for kids that are allergic to dogs and cats. Best of all these pets don't have to be house trained!

To make an "ant farm" you will need:

1 Large Glass Jar, Fish Bowl or Tank

Ants

Dirt

smaller jar or tube

Start by placing the smaller jar or tube inside the larger glass [container](#). Using a small jar will encourage the ants to build their tunnels on the outside of the jar where your child can see them instead of tunneling in the middle.

Next find an ant pile and using a shovel carefully dig enough ants and dirt to fill your jar within 2-3 inches from the top. Pack the dirt firmly. You can use other dirt to fill your jar but it is easy to use just transplant the anthill into it's new [home](#). If you are using red ants or other varieties that can bite keep your child a safe distance away from this part of the project.

Capture as many ants as you can including a ant that looks larger than the others and a queen ant which may have wings. You might also scoop up little white eggs and larvae.

If ants are not readily available in your area craft and hobby stores can generally give you information on where to mail order them. They are generally very inexpensive and travel well.

Ants like to eat small bread crumbs, or bread dipped in sugar water or with a drop of honey. They can also eat tiny bits of fruit and vegetables but don't feed them to much or their tank can get cluttered before they can remove it to their underground storage space.

To water your new pets, let your child drop a water soaked cotton ball into the jar. Most of the liquid ants need they can get from their food but it is a good idea to add a new wet cotton ball every few days as needed.

Your ants probably will not be able to climb up the [glass](#) walls of the jar but if there is a chance the jar could be knocked over it is safer to include a top with holes punched for adequate air supply. The added darkness can also trick ants into feeling they are underground.

Your new ants will immediately become busy working on their new home. Discourage kids from moving the jar: this could settle the dirt and cave in the ants' tunnels. To have more fun with your ants, you can add miniture trees or tiny farmhouses found at hobby stores.

Insects

Skimming and Scanning

SCANNING

Scanning is the first thing that you do when you select a resource. It answers the question: -

Is this the right resource to help me find the answers to my questions? Will it give me the answers I want?

SCAN - by zapping through the whole resource homing in on the important bits.

Scan before you start skimming.

Scanning gives you a feeling for the whole item.

Think:

- Is it relevant?
- Is there anything in it that answers the target questions?

Look at:

- Title page.
- The contents page. Are there chapters or sections that you may want to read?
- Are there maps, diagrams, pictures, captions? Do they look as if they would be helpful?

SKIMMING

Skim by zooming through the text quickly trying to spot key words. Don't start at the beginning and plod or shuffle through the text. After you have scanned the text and found the bits that you think look relevant and interesting then skim read. Concentrate keep your keywords and questions in your mind.

Reference: Gawith, G. (1998) *Action Learning* Longman Paul Auckland

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Learning task 4: Research and presentation

Independent Research

Using inquiry skills students investigate an insect that is of interest to them. Plan questions and conference with teacher to ensure questions are manageable. Students research, read draft, edit proof read, teacher conference and present their findings to demonstrate their understanding and knowledge of insects.

Research

Your task is to choose a topic in which you are interested, find out enough about the topic for you to become an "expert" so that you can lead a mini-seminar in which you share your expertise with the rest of the class.

You may work by yourself or with a partner.

Here is what you do:

Choose a topic, in which you are interested but which you know little about eg.

- a sport or sports personality,
- a hobby you would like to take up (eg. collecting, cooking, models),
- a famous person,
- an historical event,
- a place or country,
- an endangered animal,
- a scientific topic.

Write down 3 specific questions you would like to answer as a result of your research.

Ask your teacher to check that they are not so broad that they are too difficult to research or so narrow that there is no research challenge involved.

You must use at least TWO different sources of information to gather the answers to your questions.

1. One must be from a primary source ie information that you generate for yourself. This will include at least one of the following:
 - conducting an interview (including phone interviews),
 - writing a letter seeking information,
 - emailing for information or joining an Internet Forum related to your topic,
 - conducting a survey.
2. One must be from a secondary source ie. information generated by others. This will include at least one of the following:
 - books, magazines, articles,
 - the media eg. television, radio, newspapers, websites.

Prepare a 10 minute seminar to be presented to the class, which reports the results of your research. In this seminar you must have:

1. Something to tell ie. the questions you wanted answered, how you went about your research, the answers to your original questions if you have been able to answer them, the most and least successful research methods and what you would do differently if you were going to do the assignment again. Make sure you let your classmates ask any questions they need to clarify their understanding.
2. Something to show (pictures or posters, a demonstration, over-head transparency, model, map, video, computer display, dramatic skit, wall-chart, diagrams, web site etc.) - whatever will help you explain and illustrate your topic in a more informative and interesting way.
3. A listening quiz. Part of the purpose of this assignment is to improve listening skills. As part of your seminar presentation prepare a listening quiz with 5 questions which you give the class (orally) at the end of your seminar. Your quiz could include:
 - recall questions,
 - true/false questions,
 - multi-choice questions,
 - 'spot the mistake' type activities.

Perhaps as a class you could discuss with your teacher the possibility of providing prizes for those who do best in the listening quiz.

Several days before you are due to deliver your seminar make sure you can place a tick beside each of the following:

- I have had my research questions approved by my teacher.
- In my research I have used at least one primary and one secondary source of information.

- My seminar includes my original research questions, how I went about finding the answers, the answers to my questions and what I would do differently next time.
- My seminar has a visual component which adds interest and helps my explanation.
- My seminar has a listening quiz.
- I have practised the delivery of my seminar

For customisable student check-list, see these Assessment Resource Bank resources:

- [Checklist for Editing](#)
- [Checklist for Proof-reading](#)

Presentation

Discuss ways in which the students' work can be presented - list ideas suggested by the students. Students can record their findings on:

- video (this could be a documentary)
- audio (this could be a radio report about the work of some "junior scientists" and their research into the life of a specific insect)
- digital camera (which could then be downloaded onto the computer)
- overhead transparencies (using colour photographs or transparency pens)
- chart (including information and diagram)
- slideshow presentation.

In pairs or individually, students investigate, read, draft, revise, edit, proofread and prepare their presentation. This will be presented orally as a seminar to the class

Teacher or students video each presentation. Students use this video to assess their oral presentation.